

TITLE: HOME AUTOMATION AND SECURITY SYSTEM CONTROLLER

FIELD OF THE INVENTION

The present invention relates to a controller for a
5 home automation and security system and in particular, to a
controller for a home automation and security system having
a graphical interface.

10 BACKGROUND OF THE INVENTION

Security systems are becoming widespread in use
with most commercial establishments and many residential
establishments having security systems installed. Such
security systems generally include a control panel which
15 controls the overall operation of the system, one or more
keypads for user access to the system and various detectors
and sensors. The control panel is generally mounted in an
area of restricted access, such as a utility room or
basement, and contains the system electronics, back-up
20 power sources, and may include an interface for a remote
monitoring. Security systems are generally divided into
several zones or areas of protection and each of these
zones generally has one or more detection devices or
sensors such as motion detectors, door or window contacts,
25 glass break detectors, detectors or shock sensors connected
to it. In some security systems, smoke detectors or other
fire detection devices may also be connected to the control
panel. Security systems generally have one or more keypads
which are used by the user to interface to the security
30 system. The key pad is used to send commands to the system
to control the operation of the system and may also display
system information. Such key pads generally have a status
display which may include either individual indicators,
such as light emitting diodes or may include a LCD or LED
35 display, which is capable of displaying a number of alpha-
numeric characters and can display simple messages
regarding the status and operation of the system. Such
controllers may not be generally user friendly, as while

the controller may display the status of a zone as in a message such as "Zone 2 Open", the user of the system may not readily know where in the establishment Zone 2 is located, and may have to recall from their memory the set-up and programming of the security system. In an emergency or other panic situation, such information may not be easily recalled.

Attempts to overcome this drawback have been developed, such as the use of control panels which include a graphic of the layout of the establishment with LED displays which display the status of the system in areas of the establishment. However, such graphic controllers are generally part of the control panel which, as noted above, is generally in a location which is not easily accessible.

There have also been attempts to develop computer controlled systems where the interface with the security system is provided through a personal computer. While such a set-up is useful for programming of the security system, it is not generally usable for monitoring the status of the system in an emergency as it requires that the computer be constantly on, and that the computer be located in a location accessible to the user in the event of an emergency.

With the advances in computer technology, home automation, in terms of controlling lighting, temperature and other environmental factors in a home or office environment has become more widespread. There are many programs and interfaces available for personal computers which enable control of environmental factors such as lighting, heating, cooling, etc. in a home or office environment. However, once again, such a system requires the use of a fairly powerful home computer which may not be easily accessible at all times.

There thus remains a need for a simple to use controller for a home security or home automation system which provides for ease of programming and operation of the system and clearly understood status displays, especially
5 in emergency situations.

SUMMARY OF THE INVENTION

The present invention, in one aspect, is directed to a controller for controlling the function of components
10 of a security system. The controller comprises a touch sensitive screen, a graphical representation of the security system and the components displayed on the screen. The function of the components of the security system are controlled by touching a portion of the screen having the
15 component or security system to be controlled displayed thereon.

BRIEF DESCRIPTION OF THE DRAWINGS

Preferred embodiments of the present invention are
20 illustrated in the attached drawings, wherein:

Figure 1 is a schematic view of a security system, utilizing the controller of the present invention;

Figure 2 is a perspective view of a preferred embodiment of the controller of the present invention..

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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

A typical security system is illustrated in Figure 1. Security system comprises a control panel 10 which controls the operation of the overall security system. A
30 number of detection devices 12 utilized for monitoring a zone or area of protection are connected to the control panel in a typical manner. Detection devices 12 may be any of the commonly utilized detection devices such as motion detectors, door contacts, glass break detectors or shock
35 sensors. While in Figure 1 the sensors 12 are shown as being hard wired to the control panel 10, wireless technology is in common use and may also be utilized for communication between the sensor 12 and the control panel

10. The security system may be connected to a remote monitoring station 14, utilizing any of the commonly employed methods of communication such as utilizing a telephone dialer sending messages to the remote monitoring station 14 using local telephone systems 16. In some situations, the connection between the control panel 10 and the remote monitoring location 14 may also be wireless, utilizing cellular telephone technology or other means of wireless communication. The controller 20 of the present invention is also connected to the control panel 10 for allowing the user to interface with the security system, to program the system and control the operation of the system and for displaying the status of the system and its various components.

Figure 2 illustrates a perspective view of the controller 20 of Figure 1. As illustrated, controller 20 has a case 22 typically constructed of plastic for containing the components of the controller 20. On the front of the case 22, there is provided a window 24 in which a suitable graphic display 26 is located. Preferably, the graphic display is a LED or LCD display having a display resolution sufficient to permit readily discernible graphical and alpha-numeric information to be displayed thereon. Such display is typically a LED or LCD display having a resolution of at least about 100 pixels in both the vertical and horizontal direction. Preferably, the display has a resolution of at least about 300 pixels horizontally and at least about 200 pixels vertically to enable the display to provide readily discernible graphical and alpha-numerical information. In the embodiment of the controller 20 as illustrated in Figure 2, the controller may be provided with a numeric key pad having numeric keys 28 typical of security system controllers. Controller 20 may also be provided with function keys or "hot" keys 30 for rapid access to various features of the controller 20.

The screen 26 of the controller 20 is preferably a touch sensitive screen whereby the operation of the security system may be controlled through touching of the screen 26 in the appropriate position. As illustrated in the Figures, the controller 20 may be set up to display a floor plan of the establishment at which the security system is located. The display could be programmed to show the location of the various sensors of the security system and their status. Should a user wish further information on a sensor in a particular location, or should they wish to program the functions of the security system with respect to the sensor, touching the screen in the appropriate location could bring up a selection list to check or program the operation of the sensors. Such selection list could be provided as a graphical menu overlay visible over the floor plan, or alternatively could be provided as a "hot" button list 32 displayed below the floor plan. Touching one of the menu items or buttons 32 in the hot button list would activate a command or provide further information on a sensor. Depending upon the function of the controller selected on the touch screen, the options available on the hot button list 32 could be varied.

The controller 20 of the present invention may also be utilized in conjunction with the control panel for controlling of home automation functions. Such home automation functions may include turning on and off selected lights at selected intervals, and other typical functions normally associated with home automation. For example, with the controller illustrated in Figure 2, one of the function keys 30 or one of the buttons on the hot button list 32 may provide for access to home automation functions. Once the home automation function protocol is activated, then the selected home automation functions associated with a particular area of the establishment may be controlled through the touch screen 26. Thus, for example, a user could touch a selected area on the floor

plan and then by selecting either a menu item or a button from the hot button list could program the turning on or turning off of the light in the selected area at selected times. Similarly, the system could be utilized to
5 influence the environmental conditions within the establishments by setting temperature set points for varying the temperature within the establishment at selected times. Thus, for example, in a home environment, the user could program the system to maintain a relatively
10 low temperature when no one is expected to be home and to program the system to increase the temperature just prior to the time when people are expected to arrive at the establishment.

15 In a preferred embodiment, the controller would also provide an interface to the utility services to monitor energy usage in the environment in which the controller is located. For example, in many locations, the meters utilized by utility services such as the
20 electrical power or hydro service, water and gas services are provided with an interface to allow downloading of information the the utility service for billing purposes. The controller of the present invention could utilize this interface to provide the user with an indication of the
25 user's usage of the energy source provided by the utility service. If the controller were also provided with the current rate schedule of each of the utility services, the controller could also display the cost of the services utilized.

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In a preferred embodiment, the controller 20 of the present invention is also able to act as a information display for display of user selected information such as, for example, current weather, news headlines, sports or
35 stock markets quotes, etc. In this system, the controller would be interfaced to a data access provider 40 through a modem link associated with the control panel 10. The data access provider 40 would preferably have a user profile for

each individual location or establishment at which
controllers 20 are located. This user profile would be
selectable and programmable by the user such that they
could select the specific types of information which they
5 wish to have displayed on the controller 20, as well as the
times for display of such information. For example, a user
could program their user profile to have the current
weather conditions and weather forecast displayed on the
controller display from the time they normally rise in the
10 morning until the time they would normally leave the
establishment to go to work.

The data access provider 40 would retrieve the
desired information from the required sources and repackage
15 the information for transmission to the controller of the
user. Thus the data access provider may access news,
sports, business information, stock market quotes, weather,
etc. information sources to provide the information
requested by the user in their profile. The relevant
20 information may be retrieved from commercial or other
database providers 42 either by a direct link access or the
database providers may be accessed through the Internet
using any of the commonly employed methods or protocols.
Some sources may be accessed through the World Wide Web
25 (WWW) using a suitably configured web browser. Other
sources may be accessed by Telnet, Gopher, FTP or email,
depending upon the access method necessary for retrieving
the information from the database provider. When utilizing
protocols other than the HTTP protocol used on the WWW, the
30 database provider may be accessed by the enhanced
capabilities of Web Browsers or by applications separate
from a Web Browser.

Once the information is retrieved, it is repackaged
35 in a form suitable for transmission to the controller 20.
The repackaging required would depend upon such factors as
the format of the data, the amount of the data, whether the
information is to be abstracted or highlighted, and other

factors which would be apparent to those skilled in the art. Once the information is repackaged in the desired format, it is transmitted to the controller 20 for display on the graphical display. Depending upon the type and amount of information to be displayed as well as the user's desired preferences, the information displayed on the graphical controller may first present a menu of information which the user can select from to display further information on a particular topic. For example, a menu list giving the types of information such as news highlights, weather, sports scores, etc. may be initially displayed. The user could then select one of the items from the list and either a further user selectable sub-menu may be displayed or the information for the topic itself may be displayed. The information could be displayed screen by screen, such that one screen of information is displayed for sufficient time for the user to read the information. The controller would, after the selected time, display the next screen of information. Alternatively, the controller may display the information in its entirety by scrolling through all of the information in a topic. The scrolling rate of the display would be such as to enable the user to read and comprehend the information displayed. When the controller is configured to present the information by scrolling, a hot button could also be provided to enable the user to pause the scrolling if they wished to view the information for a longer time such as for example to make written notes of the information. A scrolling display could also be used to present all of the information continuously without the use of menu items. In these situations, the controller could scroll through all of the information that has been downloaded and once the end of the information has been reached, it could commence again at the beginning.

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As the primary purpose of the controller 20 is the control of a security system, the controller 20 would be programmed to give priority to the monitoring of the

security system. The controller 20 could be constantly monitoring the conditions of the sensors 12 on a regular time interval, even when the controller is displaying the user selected information. If at any time the controller
5 20 detects the activation of any of the sensors 12, then the controller 20 would immediately cease the display of information and switch to the security system monitoring and control functions. Alternatively, the security system may be configured to be interruptible on receiving a
10 suitable signal from one of the sensors or detectors 12. Upon receipt of the interrupt or alarm condition signal from the sensor or detector 12, the controller 20 would automatically switch to the security system monitoring and control functions.

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The functions of the data access provider 40 may be provided as an additional service provided by the security system monitoring service 14. In this type of setup, the communications between the data access provider 40 and the
20 controller 20 could use the same circuitry as the communication between the controller 20 and the security system monitoring service 14. The security system monitoring service could provide the information in the manner described above to the controller. In addition, the
25 security system monitoring service would also perform its usual functions and could, while communicating with the controller 20 to provide the user selected data, receive feedback on the status of the security system. If an alarm condition is detected in the security system, the security
30 system monitoring service 14 would immediately cease the functions of the data access provider and switch to the functions of the security system monitoring service.

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The functions of the data access provider 40 and the security system monitoring service 14 may also be provided by different entities. For example, the dealer who installed the security system or the manufacturer of the controller could provide the data access provider

service as an additional service to the purchaser. In many locations, the dealers or manufacturers do not themselves provide the security system monitoring but use a central service to provide such functions to their customers. In
5 these situations, the dealer or manufacturer could provide the data access provider services in the manner described above.

In setups in which the data access provider is
10 separate from the monitoring service, the communications between the controller and the data access provider may be distinct from the communications between the controller and the security system monitoring service, although some of the circuitry utilized for this communication may also be
15 used for the communication with the data access provider. For example, security systems which communicate with a monitoring service typically do so over the regular telephone system. These security systems are generally provided with a modem as part of the control panel which is
20 utilized for this communication. The modem circuitry for the communication with the monitoring service could also be utilized for the communication with the data access provider. In these situations, the security system would be configured to drop any connection with the data access
25 provider when an alarm condition is detected to enable the immediate communication with the monitoring service. Alternatively, the communication path for communicating with the data access provider may be provided with its own modem separate and apart from the modem for the monitoring
30 service. Once again however if the security system detects an alarm condition while communicating with the data access provider, the controller would immediately drop the connection to enable the security system to communicate with the monitoring service. This would be preferred, even
35 if the two modems were on separate telephone lines as it would be desirable that the controller would be dedicated to its primary function of security system monitoring and control functions in these situations.

Alarm systems according to the present invention which are capable of displaying information as described above may also be adapted to provide for other levels of notification of information which may be of importance to the user. In some circumstances, the data access provider may have the capability of interfacing with the alarm system to provide alerts to the user when particularly important information is being transmitted to the alarm system. This is of particular use where the data access provider is capable of initiating communication with the alarm system. In such a setup, as soon as the data access provider is made aware of information which would be of particular interest to the user, the data access provider may initiate a transmission and transmit the information to the alarm system. In addition to transmitting the information, the data access provider may also have the capability of interfacing with the alarm system to, for example, annunciate the arrival of the information.

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It is also possible to provide for a dedicated connection to the data service provider. Currently, the technology exists for cable modem access, ADSL access or access through a signal on top of the electrical utility service amongst other technologies. All of these technologies provide for dedicated, continuous access to a data service provider. If such dedicated, continuous service is provided, then a higher degree of integration between the data access provider and the security system of the present invention is possible.

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In circumstances where there is a dedicated connection or where the data access provider is able to initiate communication, some of the information communicated may be used to control functions of the alarm system. For example, if a weather advisory is issued for an area in which the security system is located, the data access provider could transmit the weather advisory and

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alert the user to the existence of the weather advisory. Depending upon the severity of the advisory, the data access provider could instruct the security system to either display the advisory or using the sounding capabilities of the security system annunciate an alert. 5 If the weather advisory is not severe, the data access provider could instruct the alarm system to sound a keypad buzzer or provide other sounding depending upon the capabilities of the keypad controller. If the weather 10 advisory were severe such as a storm warning or tornado or hurricane watch, the data access provider could instruct the alarm system to sound the alarm annunciator. In addition to weather advisory, the system could also be configured to provide a warning of other events which may 15 be of concern to the user. For example, users which have school age children on the premises, may have the data access provider monitor school closing and when a school closing is announced, could instruct the alarm system to notifier the user of the school closing. Other uses of 20 such a feature of the alarm system of the present invention will be apparent to those skilled in the art.

Although various preferred embodiments of the present invention have been described herein in detail, it 25 will be appreciated by those skilled in the art, that variations may be made thereto without departing from the spirit of the invention or the scope of the appended claims.